

STAT

Introductory Remarks:

The Precipitation Ratio and
the Methods for its Computation

Wladyslaw Gorczynski

Przegląd Meteorologiczny i Hydrologiczny,
No 1-4 (1949), pages 42-43.

STAT

INTRODUCTORY REMARKS:
THE PRECIPITATION RATIO AND THE METHODS FOR ITS COMPUTATION

Wladyslaw Gorczynski

INTRODUCTION

The basic factors in climatology are the following: the duration and intensity of solar radiation; the temperatures of the air, water, and earth; the pressure and the currents of the air, which depend upon the general circulation of the atmosphere; the moisture and the degree of cloudiness, as well as precipitation in all of its forms.

Apart from these direct factors, it is extremely worthwhile to introduce into the deliberations some derivative factors, especially the precipitation ratio and the aridity factor. The precipitation ratio serves first of all for investigations on the variability of precipitation. Combining this factor with the so-called continental thermics leads to the aridity factor which plays a role of primary importance in the classification of climates.

During the past few decades, the fluctuations in precipitation and in aridity have been the subject of studies by several scientists. As early as 1920, Lang (see under No 2 on the bibliographical list) attempted to introduce a certain factor that would characterize the fluctuations in precipitation in connection with the temperature of the air. The Lang factor was not very complex; it was sufficient to divide the depth of the precipitation (R) in

millimeters by the average temperature (T) on a 100-degree scale. For a locality having a mean annual precipitation of 250 millimeters, for example, and an average temperature of 10 degrees Centigrade, this factor will amount to 25. In the year 1926, Hirth delineated isonotides [izonotidy] as the isarhythms [izarytmy] of the factors introduced by Lang. Lang's concept was developed by E. de Martonne who arbitrarily enlarged the value of air temperature by 10 degrees in order to avoid negative values. In such a way, this factor (the so-called index of aridity) amounted to $R: (T + 10)$, instead of the Lang factor of $R:T$. E. de Martonne (NO 4 in the bibliography) published several dissertations on this subject in which he computed the so-called aridity index for different continents.

In Germany, Hellmann computed and made cartographic studies of the relations between the maximum and the minimum annual ^{rations}precipitations. He introduced the ^{ratio}quotient (Max) : (Min) in his numerous published works.

The author of this article has occupied himself since 1917 with the degrees of the continental thermics with respect to their application to precipitation fluctuations. Shortly after the appearance of the first papers on ⁿcontinentalism, the author's assistant, J. P. Rychlinski, applied the degrees of ⁿcontinentalism to investigations of the fluctuations of precipitation in Australia and in Tunisia. Unfortunately, these beginnings toward the introduction of the aridity factor were temporarily halted as a result of the premature death of Rychlinski in 1927 and because of the author's own numerous journeys over the years 1925-1936 for

the purpose of investigating solar radiation around the earth. It was only in the second half of 1939, when the author arrived in Washington as the Polish delegate to the conference of the International Geodetic and Geophysical Union, that the studies on the aridity factor entered upon a new phase. The stay in the United States, originally planned for a few months, was extended to the middle of 1947 due to World War II. This provided the author with the opportunity of devoting all of his time to the studies of the aridity factors in California and in Florida. California is located in the southeastern part of the so-called American desert which passes through Arizona, New Mexico, and embraces one half of the state of Texas. For this reason, a whole series of papers appeared on the aridity factor (see Nos 7 and 8 under the bibliography) during the years 1940-1946. The book Comparison of Climate of the United States and Europe, published in New York in 1945, contains a compilation of the results of these investigations concerning the aridity factors in connection with the decimal classification of the climates on the earth.
